

**IN THE CLAIMS**

**Please amend the claims as follows:**

Claim 1 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation, comprising:

at least one incident beam of input optical radiation;

a multilayer structure containing one or more layers with a negative dielectric constant and one or more other layers with a positive dielectric constant designed so that [[the]] said multilayer structure supports at least one surface plasmon-polariton mode, and designed so that at least one of said modes allows the optical parametric interaction of two surface plasmon-polaritons of angular frequencies  $\omega_a$  and  $\omega_b$ , resulting in the conversion to a frequency-upshifted surface plasmon-polariton with angular frequency  $\omega_a + \delta$  and a surface plasmon-polariton, downshifted by an equal amount, with angular frequency  $\omega_b - \delta$ , where  $\delta$  is a particular angular frequency shift or set of angular frequency shifts and one or both of said angular frequencies  $\omega_a$  and  $\omega_b$  is an angular frequency or set of angular frequencies present in at least one of [[the]] said incident beams of input optical radiation; means for electrical coupling into a subset of said surface plasmon-polariton modes at said angular frequencies  $\omega_a$  or  $\omega_b$  or said angular frequencies  $\omega_a + \delta$  or  $\omega_b - \delta$  of [[the]] said multilayer structure; means for coupling said input optical radiation into one or more of said surface plasmon-polariton modes at said angular frequencies  $\omega_a$  or  $\omega_b$  or said angular frequencies  $\omega_a + \delta$  or  $\omega_b - \delta$  of [[the]] said multilayer structure; means for coupling output optical radiation at angular frequencies  $\omega_a + \delta$  or  $\omega_b - \delta$  out of [[the]] said multilayer structure; means for coupling output optical radiation at angular frequency  $\omega_a$  and  $\omega_b$  out of [[the]] said multilayer structure; and means for coupling output optical radiation at angular frequencies other than  $\omega_a$ ,  $\omega_b$ ,  $\omega_a + \delta$  or  $\omega_b - \delta$  out of [[the]] said multilayer structure.

Claim 2 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said subset of said surface plasmon-polariton modes being null, so that said means for electrical coupling is absent.

Claim 3 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said two surface plasmon-polaritons of angular frequencies  $\omega_a$  and  $\omega_b$  having equal angular frequencies  $\omega_a = \omega_b$ , which is referred to as  $\omega_a = \omega_b = \omega_0$ .

Claim 4 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, point or points on the dispersion relation of the said surface plasmon-polariton mode or modes corresponding to the points of inflection on the said dispersion relation.

Claim 5 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of a pulse or pulses of coherent laser radiation with a well-defined central angular frequency.

Claim 6 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of continuous wave laser radiation with a well-defined central angular frequency.

Claim 7 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of a combination of a pulse or pulses of coherent laser radiation with well-defined

central angular frequency or frequencies and continuous wave laser radiation with well-defined central angular frequency or frequencies.

Claim 8 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for electrical coupling into a subset of said surface plasmon-polariton modes being an electric current passed through one or more of said layers with a negative dielectric constant or one or more of said other layers with a positive dielectric constant or combinations of these.

Claim 9 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein said device is used to produce frequency-converted output optical radiation.

Claim 10 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of a single said incident beam of input optical radiation.

Claim 11 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein the device is used to produce frequency-converted output optical radiation that is has a wider frequency spectrum than the said incident beam or beams of input optical radiation.

Claim 12 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein the said output optical radiation has a component that consists of a supercontinuum.

Claim 13 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein said device is used to modulate the frequency, amplitude, optical phase or state of polarization of at least one frequency-component of the said output optical radiation.

Claim 14 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of two beams: an incident beam of input optical radiation with central angular frequency  $\omega_0$  and an incident beam of input optical radiation with central angular frequency  $\omega_0 + \delta$  or  $\omega_0 - \delta$ , where  $\delta$  is a particular angular frequency shift or set of angular frequency shifts.

Claim 15 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein the said device is used to produce a said output optical radiation at angular frequencies  $\omega + \delta$  or  $\omega - \delta$  that is modulated by the said device, where  $\delta$  is a particular angular frequency shift or set of angular frequency shifts, and  $\omega_a = \omega_b = \omega_0$ .

Claim 16 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein the said device is used to produce a said output optical radiation at angular frequency  $\omega_0$  that is modulated by the said device.

Claim 17 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of three beams, an incident beam of input optical radiation with central angular

frequency  $\omega_0$  and two incident beams of input optical radiation with central angular frequencies  $\omega_0 + \delta$  and  $\omega_0 - \delta$ , wherein the said device is used to produce said output optical radiation at angular frequency  $\omega_0$ ,  $\omega_0 + \delta$  or  $\omega_0 - \delta$  or a combination of these angular frequencies that is modulated by the said device, where  $\delta$  is a particular angular frequency shift or set of angular frequency shifts, and  $\omega_a = \omega_b = \omega_0$ .

Claim 18 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, wherein said device is used to amplify at least one frequency-component of the said input optical radiation.

Claim 19 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said incident beam or beams of input optical radiation being composed of two beams, an incident beam of input optical radiation with central angular frequency  $\omega_0$  and an incident beam of input optical radiation with central angular frequency  $\omega_0 + \delta$  or  $\omega_0 - \delta$  wherein the said device is used to produce amplified output optical radiation at angular frequencies  $\omega_0 + \delta$  or  $\omega_0 - \delta$ , where  $\delta$  is a particular angular frequency shift or set of angular frequency shifts, and  $\omega_a = \omega_b = \omega_0$ .

Claim 20 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being composed of planar layers with parallel interfaces.

Claim 21 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being composed of layers that possess a radius of curvature or radii of curvature.

Claim 22 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being composed of layers, at least one of which has a cross section in the form of a wedge.

Claim 23 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being composed of layers, at least one of which has the form of a waveguide with an axis oriented parallel to the layers of the said multilayer structure and bounded by two surfaces perpendicular to said layers of the said multilayer structure.

Claim 24 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said axis of said waveguide being a straight line.

Claim 25 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said axis of said waveguide being a curved line.

Claim 26 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said layers with a negative dielectric constant of said multilayer structure being composed of metal.

Claim 27 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said layers with a negative dielectric constant of said multilayer structure being composed of semiconductor or doped semiconductor.

Claim 28 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said layers with a negative dielectric constant of said multilayer structure being composed of a combination of metal, semiconductor or doped semiconductor layers.

Claim 29 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, by part of said multilayer structure being composed of a sandwich made up of a odd number of materials with one said layer with a negative dielectric constant at the centre, and with said other layers with a positive dielectric constant disposed symmetrically either side.

Claim 30 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, part of said multilayer structure being composed of a sandwich made up of five materials in the order dielectric layer 1, dielectric layer 2, layer with a negative dielectric constant, dielectric layer 2, dielectric layer 1, where the terms dielectric layer 1 and dielectric layer 2 refer to said dielectric layers with different dielectric constants.

Claim 31 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being composed of layers that are thin enough for the said multilayer structure to be considered as a graded distribution of dielectric constant in the direction perpendicular to the said layers.

Claim 32 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being equipped with reflectors oriented perpendicular to the layers to allow the multiple reflection of said surface plasmon-polaritons

inside the said multilayer structure and thus enhance the efficiency of the said device.

Claim 33 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being equipped with reflectors oriented perpendicular to the layers to allow the multiple reflection of said input optical radiation or said output optical radiation inside the said multilayer structure and thus enhance the efficiency of the said device.

Claim 34 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being equipped with reflectors, oriented parallel to the layers of the said multilayer, situated either side of the multilayer structure to allow the multiple reflection of said surface plasmon-polaritons inside the said multilayer structure and thus enhance the efficiency of the said device.

Claim 35 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being equipped with reflectors, oriented parallel to the layers of the said multilayer, situated either side of the multilayer structure to allow the multiple reflection of said surface plasmon-polaritons inside the said multilayer structure and thus enhance the efficiency of the said device, in which the reflectors are distributed Bragg reflectors.

Claim 36 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said multilayer structure being cooled.

Claim 37 (Currently Amended) ~~Device~~ A device for the conversion of optical



radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including a focusing system.

Claim 38 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including a said focusing system in which the angular divergence of the said incident beam of input optical radiation can be varied.

Claim 39 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes allowing the angle of incidence of the said incident beam of input optical radiation on the said multilayer structure to be varied.

Claim 40 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including polarizing elements to allow the use of a specific incident state of polarization of the said input optical radiation.

Claim 41 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including polarizing elements to allow the use of linearly polarized input optical radiation polarized in the plane of incidence.

Claim 42 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface

plasmon-polariton modes including a dielectric material that is placed in contact with a surface of the said multilayer structure.

Claim 43 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including a said dielectric material that is placed in contact with the said multilayer structure, in which this said dielectric material is in the form of a prism, hemisphere or hemicylinder.

Claim 44 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including a said dielectric material that is placed in contact with the said multilayer structure, in which a second dielectric material is placed between the said dielectric material and a surface of the said multilayer structure.

Claim 45 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including input optical radiation incident on a side of the said multilayer structure.

Claim 46 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling said input optical radiation into said surface plasmon-polariton modes including a periodic grating structure on the surface or inside the said multilayer structure.

Claim 47 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including a focusing system used to collimate the said output optical radiation.

Claim 48 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including a dielectric material that is placed in contact with a surface of the said multilayer structure.

Claim 49 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including a said dielectric material that is placed in contact with the said multilayer structure, in which this said dielectric material is in the form of a prism, hemisphere or hemicylinder.

Claim 50 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including a said dielectric material that is placed in contact with the said multilayer structure, in which a second dielectric material is placed between the said dielectric material and a surface of the said multilayer structure.

Claim 51 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including the said output optical radiation exiting from a side of the said

multilayer structure.

Claim 52 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including a periodic grating structure on the surface or inside the said multilayer structure.

Claim 53 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including an optical frequency filtering system.

Claim 54 (Currently Amended) ~~Device~~ A device for the conversion of optical radiation of claim 1, the said means for coupling output optical radiation out of the said multilayer structure including an element in common with the said means for coupling said input optical radiation into said surface plasmon-polariton modes of the said multilayer structure.